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Mobile Internet Users Profile Along With Subscribers Model of Payment and Attitudinal Characteristics

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Abstract

The main purpose of this paper is study the mobile internet services in Greece and to identify clusters of users based on psycographic and demographic characteristics. Additionally, the clusters entail variables that depict the payment models like type of subscription and monthly cost. Further, the research explores the degree of mobile internet services usage and mobile technology adoption. Finally, some conclusions, after grouping the users based on their characteristics, are extracted.

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Keywords: Mobile Internet User Profile; Payment Method; Cluster Analysis

1. Introduction

Internet access through mobile phones (MP) has concentrated a lot of attention in recent years, due to the great number of applications that a user can utilize. Mobile commerce is a growing market which provides on the one hand the potential for enterprises to increase their market share and open the doors of new markets and on the other enables users to achieve several mobile commerce tasks.

Mobile phones due to their processing power can nowadays provide their users with the functionality that personal computers used to provide several years ago such as multimedia on demand and internet. Mobile internet is a key-point to enter some markets. Nevertheless, although mobile internet is a novel e-commerce method, it is still growing in many countries and its penetration to the market is low in comparison with the traditional Internet access appliances. In many countries [1,2] it is limited. It is easy to notify the disadvantages of mobile internet and outline

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the reasons for not having a rapid market share in many countries. For instance, the small mobile screen does not allow users to navigate easily. Downloading capabilities are also limited [3]. Moreover, the extra cost for internet access through mobile phones can also prevent some potential adopters from making a systematic mobile internet usage or even, in some cases where economic crisis has a greater impact, the cost could be prohibited. Thus, the usage of mobile internet has some fundamental draw backs and these issues are reasons that lead individuals to either adopt or reject the mobile internet usage. There is a lot of research concerning mobile internet adopters and more particularly what are their profile characteristics, what are the variables that determine their profile etc. [4]. In [5] the authors have made an effort to determine user's profile by using demographics (such as gender, age, occupation, education) and some other personal characteristics of the user like their tendency to adopt innovative technology gadgets and their design orientation. Additionally, Okazaki, studied the profile of the mobile internet users in Japan [6].

Cluster analysis is frequently used for grouping consumers into segments based on their characteristics, attributes or properties. Variables like gender, age, income, education are basically used for clustering. It is also interesting to examine some economic parameters of the mobile internet usage like payment model. In Greece, where the economic crisis of the bank system is intense, it would be quite interesting to determine the mobile internet adopters using their demographics, some personality characteristics and economic parameters of the monthly bill that is to be paid. So, target offers to customer groups can be adapted accordingly by mobile internet service providers.

In this paper, a study of the mobile internet services in Greece is made. Additionally, an attempt is made to classify mobile internet adopters according to their demographics, attitudes and cost parameters of their subscription. The specific objectives of the study are to find out:

- What are the most popular mobile internet services in the Greek market
- What are the payment models in the Greek market
- What are the demographic characteristics and the psycographic characteristics of the mobile internet user along with the payment models

The paper is organized as follows:

A literature review is presented, identifying the issues and the factors that have an impact on mobile Internet adopters. Next, the methodology followed in this study is analyzed. Then, the results are presented and cluster analysis is performed. Finally, conclusions, limitations and implications are presented along with propositions for further research.

2. Literature Review

It is well-known that high-tech products are substituted at a high rate by new versions. This fact has as an effect on the one hand an increasing competition among companies and on the other the continuous evolution of customers' expectations and needs [7]. Hence, the upgrading of existing technologies is rapid [8, 9]. Consequently, high-tech enterprises focus on product's innovations rather than on customer needs [10, 11]. The fast substitution high-tech products with new versions could create a customer that wants to follow closely the technology evolution because of the influence of a feeling that he/she must be always up-to-date. This kind of customer is a technology victim.

Another thing that can drive customers to adopt new technology products is the tendency that new gadgets can make someone be unique in the social environment he or she lines in. Technological superiority enables individuals to feel different and create a positive image to the others. Hence, the usage of such products contributes to this way also. However, it has been shown that consumers, although technology victims, have a preference in utilities that provide simple functionality and high performance, what is mentioned in the literature as "ease of use''. Otherwise, customers are dissatisfied [12] because although the product quality is important and affects positively sales, perceived quality, by the user, is much more important and determines the overall experience the user has [5].

In the literature (for instance [13]) it has been found that demographic, economic, and psychographic characteristics are predictors of the intention of the customer to adopt advanced technology products. Regarding demographic variables like age, gender and education affects technology adoption by different customer segments

[14]. Specifically, age is an important factor affecting the attitudes of high technology users [15]. Older aged people adopt new technology products that fulfill their special needs whereas they are not technology victims [16]. Additionally, their purchasing decisions are motivated by emotional factors, whereas younger people are motivated to purchase products based on existing factual technical parameters [17].

In the relevant literature it is also found that adopters of innovative products are younger consumers with higher incomes and education. Moreover, age is related to consumer technology victimization, as well as to the tendency of having a prominent personal image. On the other hand, house income affects consumer innovativeness and new product adoption [18].

3. Methodology

3.1. The questionnaire

A structured questionnaire is used in order to collect data. Measures from the literature are used to accomplish the research needs. The questionnaire entails questions regarding the demographics of the interviewees. Moreover, it includes variables having to do with the mobile phone (MP) usage, the intensity of the mobile internet usage, the frequency of the mobile internet services and users' attitudes towards mobile internet and applications that are used through mobile internet. Variables like "technology victimization" of the user and the so-called "personality uniqueness" are multi-item variables and are used to measure the corresponding psychometric characteristics of the users as related from the utilization of mobile internet. The questionnaire was pre-tested with 40 selected individuals that are familiar to the mobile internet usage, prior to the major data collection campaign. It should be mentioned that for reasons of expedience a filtering question was included in the questionnaire were the respondents answered whether they have ever used their MP for internet connection or e-mail sending.

3.2. The sample

The data collection originates from an extensive marketing field research in all over Greece. It was conducted between April and May 2013. Out of a total of 1007 respondents, only 720 had used their MP for direct access to the Internet (i.e. answered yes to the above filtering question).

4. Data analysis

In the sample 57% are males and 43% females. 23% have an age up to 24 years old, 17% are from 25 up to 34, 25% are from 35 up to 44, 18% from 45 up to 54 and 16% are more than 55 years old. 40% of the sample has a bachelor's degree. Regarding the payment model, 60% have a private subscription whereas 40% are pre-paid subscribers. In Greece, the active MPs are more than the population. In our sample 80% of the respondents have one active MP, 18% two and 2% have three or more MPs activated. About the internet access cost 47% of the sample believe that the cost is greater than it should be and 19% believe that the cost is logically estimated for the services. The rest of the sample has a neutral opinion regarding cost and provided services.

Concerning the tension of MP usage, around 42% answered that they call from their MP frequently or very frequently, whereas 22% answered that they send SMS frequently or very frequently.

The respondents ranked also some mobile internet services based on the frequency they use them. The results are shown in figure 1. The service that is more popular is "info searching" and "e-mail" service follows. "E-commerce" and "Web TV" are the least used services.

4.1. The two-step cluster analysis

Generally, cluster analysis is utilized for segmenting cases or variables [19]. Jih and Lee [20] have used cluster analysis in order to segment mobile users based on their retail shopping motivations. There are several clustering methods, like hierarchical clustering, k-means and two-step cluster analysis. Hierarchical clustering calculates the distances between all pairs of cases, and k-means requires knowing the number of clusters in advance. Hierarchical

cluster analysis is a slow procedure when large data set is entered. Nevertheless, the latter cannot be processed when both categorical and continuous variables are included. In that case, neither hierarchical nor k-means cluster analysis can be used. On the other hand, Two-Step Cluster Analysis is more appropriate for such problems [21]. Firstly, it can identify clusters originating from sets of continuous and categorical variables. Secondly, the processing time is short. The evolution of the algorithm entails two steps. During the first step, pre-clusters are constructed. Pre-clusters are sets of the original cases that are used instead of the raw data in the hierarchical clustering. Pre-clusters merge cases, according to a distance measure (maximization of a log-likelihood function). A pre-cluster is treated as a single unit. During the second step, a hierarchical clustering algorithm is applied on the pre-clusters. Pre-clusters form sets using the well- known agglomerative clustering algorithm. The resulted set of solutions, is then optimized using the Schwarz's Bayesian inference criterion (BIC).

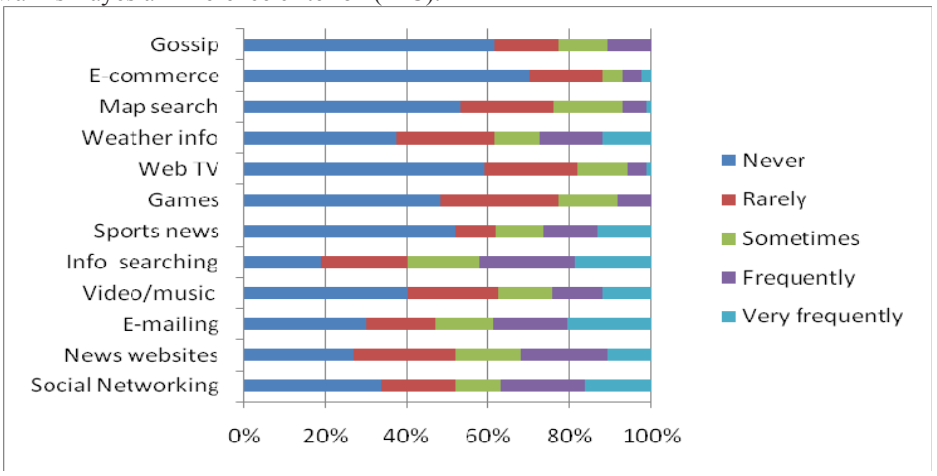

Fig. 1. Schematic diagram depicting the frequency that mobile internet services are preferred by mobile internet users.

4.2. Categorical and continuous variables

The categorical variables are shown in Table 1. The categorical variables involve gender, age, occupation, education level, the person that is paying the MP per month and the tension of the mobile internet usage. The categories per variable are also shown in the Table. The continuous variables are included in Tables 2 and 3. More particularly, Table 2 presents the descriptive statistics of the variable cost per month. The mean monthly cost is 35.56€ in a range up to 500€. Table 3 includes variables that are connected to psychographic characteristics of the user such as "personality uniqueness" and "technology victim'. Each variable consisted of a multiple-item Likert type scale, as depicted in Table 3. In order to check the sufficiency of the selected variables (continuous and non-continuous), a preliminary testing is conducted. The binary "filtering" variable is used to discriminate respondents into two groups; those that have ever used their MP for internet connection or e-mail sending and the others that are not users. Significant differences between mobile internet/e-mail users and non-users, based on the above continuous and non-continuous variables, mean that clustering make sense. For checking categorical variables, Pearson chi-square test was conducted. Gender proved to be significant between users and non-users ($p<0.05$). Simultaneously, all the other categorical variables are significant at a level $p<0.001$.

Table 1. Categorical variables used in clustering

Variables	Categories
Gender	(1) Male; (2) Female
Age	(1) 18-24; (2) 25-34; (3) 35-44; (4) 45-54; (5) $\geq$65
Occupation	(1) Student; (2) Part-time; (3) Full-time; (4) pensioner; (5) household; (6) Unemployed; (7) other
Education	(1) Not Primary school; (2) Primary school; (3) Gymnasium; (4) Licium; (5) Technological Education; (6) University; (7) Post Graduate Studies
Who is paying the bill	(1) Myself; (2) husband; (3) parent; (4) other member of the family;

	(5) Employer; (6) other
Frequency of mobile internet usage	(1) Never; (2) rarely; (3) sometimes; (4) frequently; (5) very frequently

Then, discriminant analysis was conducted with the filtering variable as independent (user or non-user) and continuous variables as dependent. Using Wilks' Lamda, the continuous variables were significantly affected by internet/e-mail user or non-user, $F(3, 165.5) = 0.85$, $P < 0.001$.

4.3. Data sufficiency

Before performing the two-step cluster analysis, some assumptions have to be tested. First of all, the representativeness of the sample is considered to be met provided that our data collection procedure was large and the members of the sample were arbitrarily chosen. Hence, it is considered that the sample has the property of representativeness (independent samples). Then, using the collinearity diagnostics tool, the undesired multi-collinearity property is rejected, based on the tolerance value. The tolerance was found to be within an acceptable range, with all scores more than 0.70, which means low collinearity among variables (see Table 3).

Table 2. Descriptive statistics of the continuous variable regarding the monthly cost of the MP

Cost per month	N	Minimum	Maximum	Mean	Std. Deviation
	1007	1	500	35.56	40.516

Next, data sufficiency for two-step cluster analysis was assessed. The independence of the members of the sample is supposed as explained above. Moreover, the normality of the continuous variables, are checked by skewness and kurtosis tests parameters. In all cases the z-values are in the domain $|z|<1.96$, indicating the approximation of the normality of the distribution at $P < 0.05$.

Finally, it is assumed that the categorical variables are multinomially distributed, due to the non-sequential nature of the data. Two-step cluster analysis is robust even if the categorical variables are not multinomial in nature.

Table 3. Continuous variables used in clustering

	Items	Alpha	Variance-extracted	Tolerance
Person who wants to be unique	2	0.652	0.93	0.733
Person who is technology victim	2	0.756	0.79	0.733

5. Results

5.1. Demographic profiling

Tables 4 and 5 show the frequency distributions for the categorical variables within and across clusters, respectively. The clusters are formulated as follows based on the majorities or the minorities of the frequency tables below:

Cluster 1 consists of young age people, students or working for a full time job, of higher education level, they obtain a 3G mobile phone and have the mobile phone bill paid by a parent. Those are technology victims, want to be unique as persons and have great mobile bills per month on average. These people seem to be the strongest consuming cluster in the sector of mobile

Table 4. Composition of Demographic Profiles WITHIN Clusters

		1 (N=93)	**2 (N=84)**	**3 (N=100)**	**4 (N=137)**	**5 (N=180)**	**6 (N=126)**
Gender	Male	52.7	50	96	78.1	91.1	0
	Female	47.3	50	4	21.9	8.9	100

Age	18-24	30.1	0	3	13.9	1.7	7.1
	25-34	52.7	0	10	24.8	18.9	14.3
	35-44	7.5	0	53	41.6	30.6	43.6
	45-54	7.5	7.1	31	14.6	32.2	30.2
	≥55	2.2	92.9	3	5.1	16.6	4.8
Occupation	Student	2.2	0	0	2.2	0	0
	Part time job	20.4	3.6	1	11.7	7.2	7.1
	Full time job	76.3	20.2	99	83.9	90	92.9
	Pensioner	0	75	0	0	0	0
	Household	0	1.2	0	0	1.1	0
	Unemployed	1.1	0	0	1.5	0.6	0
	Other	0	0	0	0.7	1.1	0
Education Level	Not even Primary school	0.0	1.2	0.0	0.7	0.6	0.0
	Primary school	0.0	20.2	2.0	1.5	8.9	1.6
	Gymnasium	2.2	11.9	0.0	6.6	15.6	5.6
	Licium	0.0	26.2	17.0	68.6	43.3	34.9
	Technological Education	29.0	4.8	26.0	0.0	8.3	22.2
	University	66.7	32.1	55.0	0.0	22.2	31.0
	Post Graduate Studies	2.2	3.6	0.0	22.6	1.1	4.8
Profession	Civil servant	16.1	39.3	63.0	13.9	0.0	38.1
	Having a personal enterprise	4.3	32.1	9.0	5.8	100.0	29.4
	Private servant	78.5	28.6	28.0	78.1	0.0	32.5
	Student	1.1	0.0	0.0	2.2	0.0	0.0
3G mobile phone	Yes	84.9	15.5	43.0	54.0	48.9	7.1
	No	6.5	28.6	41.0	24.8	21.7	41.3
	Do not Know	8.6	56.0	16.0	21.2	29.4	51.6
Who is paying the bill	Myself	81.7	86.9	100.0	92.0	94.4	81.0
	Husband/spouse	1.1	9.5	0.0	0.0	2.2	15.1
	Parent	12.9	0.0	0.0	2.9	0.0	0.0
	Other member of the family	0.0	2.4	0.0	0.7	0.0	0.8
	Employer	4.3	1.2	0.0	4.4	3.3	3.2

Table 5. Composition of Demographic Profiles ACROSS Clusters

		1 (N=93)	2 (N=84)	3 (N=100)	4 (N=137)	5 (N=180)	6 (N=126)	Total
Gender	Male	10.7	9.2	21.0	23.4	35.8	0	100
	Female	16.8	16.0	1.5	11.5	6.1	48.1	100
Age	18-24	45.2	0	4.8	30.6	4.8	14.5	100.0
	25-34	33.8	0	6.9	23.4	23.4	12.4	100.0
	35-44	3.1	0	23.3	25.1	24.2	24.2	100.0
	45-54	4.4	3.8	19.4	12.5	36.3	23.8	100.0
	55-64	1.6	61.9	2.4	5.6	23.8	4.8	100.0
Occupation	Student	40.0	0	0	60	0	0	100
	Part time job	31.1	4.9	1.6	26.2	21.3	14.8	100
	Full time job	12.2	2.9	17.0	19.8	27.9	20.1	100
	Pensioner	0	100	0	0	0	0	100
	Household	.0	33.3	0	0	66.7	0	100
	Unemployed	25.0	0	0	50	25	0	100
	Other	.0	0	0	33.3	66.7	0	100
Education Level	Not even Primary school	0	33.3	0	33.3	33.3	0	100
	Primary school	0	43.6	5.1	5.1	41.0	5.1	100
	Gymnasium	3.6	17.9	0	16.1	50.0	12.5	100
	Licium	0	8.6	6.7	36.9	30.6	17.3	100
	Technological Education	27.0	4.0	26.0	0	15.0	28.0	100
	University	27.8	12.1	24.7	0	17.9	17.5	100
	Post Graduate Studies	4.5	6.8	0	70.5	4.5	13.6	100
Profession	Civil servant	8.4	18.5	35.4	10.7	0	27.0	100
	Having a personal enterprise	1.5	10.2	3.4	3.0	67.9	14.0	100
	Private servant	26.7	8.8	10.3	39.2	0	15.0	100
	Student	25.0	0	0	75.0	0	0	100
3G mobile phone	Yes	25.8	4.2	14.1	24.2	28.8	2.9	100
	No	3.1	12.2	20.9	17.3	19.9	26.5	100
	Do not Know	3.7	21.6	7.3	13.3	24.3	29.8	100

Who is paying the bill	Myself	11.7	11.3	15.5	19.5	26.3	15.8	100
	Husband/spouse	3.10	25.00	0	0.00	12.50	59.40	100
	Parent	75.00	0	0	25.00	0	0	100
	Other member of the family	0	50.00	0	25.00	0	25.00	100
	Employer	19.00	4.80	0	28.60	28.60	19.00	100

Table 6. Mean values of the continuous variables across clusters

	Person who wants to be unique		Person who is technology victim		Euros paid per month for the mobile services	
Cluster	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
1	5.7849	1.94963	6.5484	1.94778	66.58	88.509
2	3.7500	1.86195	3.8333	2.04664	23.37	18.988
3	3.7600	1.77593	5.4100	2.02058	29.60	15.616
4	4.7664	2.13604	5.8978	2.28899	38.84	30.435
5	4.4111	1.93696	5.3222	2.36278	51.81	47.489
6	4.3810	1.90938	4.0397	1.93246	24.40	16.688

phones.

Cluster 2, on the other hand, consist of old people (more than 55 years), pensioners, obtained the compulsory education, who do not care whether they have a 3G mobile phone or not, and they do not pay the bill themselves. Those people have the lowest mean values regarding the variables that measure personality uniqueness and technology victim. The average monthly amount of money spent for mobile phone is the lowest of all clusters and hence, they seem to be the weakest segment of the mobile phone market.

Cluster 3 consists almost solely of males, middle aged, who are civil servants, have a 3G mobile phone. They have obtained a higher education level and they pay the mobile monthly subscription themselves. They pay on average 30€ per month and they have the lowest standard deviation of the amount of money among all clusters. The latter means that they have a constant communications behavior. Technology victimization and personality uniqueness are not prominent characteristics.

In **Cluster 4** there are people young aged, males, that are currently students at under graduate studies. They have 3G mobile phones, but do not pay the monthly mobile phone subscription themselves. They are close to cluster 1 regarding the psycographic characteristics under study. More specifically, they have high mean value considering technology victimization and personality uniqueness. They pay 39€ on average but have a significant standard deviation regarding the monthly mobile expenses which means that they do not have a constant consuming pattern as a cluster.

Cluster 5 entails middle aged or older males, not high educated. They are enterprise owners with full time occupation. They know that they have a 3G mobile phone, they pay the monthly subscription themselves and they do not have prominent the tendency to be technology victims or to chase for personality uniqueness. However, they are strong consumers, paying on average 52€ per month and have a great standard deviation reaching 47.5€.

Finally, **Cluster 6** solely consists of females. They are more than 34 years old, pensioners or house keeping occupation, of high education level, who pay their monthly mobile subscription themselves, do not care whether they have a 3G mobile phone and have comparatively low monthly mobile expenses. They have low mean value regarding the continuous variables under study.

6. Conclusions, limitations, implications and further research

There are some limitations regarding this study. The sample may not have been representative regarding the profile of the mobile phone user in Greece. Males and females for example did not follow the actual population percentages but the sample consisted of 57% of males. The same way the other categorical variables for example are not clear if they are representative of the whole Greek population.

This study proposes that Greek mobile internet users can be segmented into six classes based on demographic characteristics, payment models and attitudinal characteristics. The results undoubtedly, gave an insight to a strategic segmentation of the mobile internet users. People are segmented according to their capacity to spend for the mobile internet subscription and comments are made on how constant is the above mentioned spending pattern on mobile internet.

The 3G network is well established and 4G is now penetrating the market. It is interesting to show that Greek market is indifferent whether they have a mobile phone appliance with 3G capabilities. Even those that are technology victims do not structure great majorities around 3G mobile phones. Hence, the penetration of 4G seems to be difficult because advanced technology is not a key point to formulate market patterns. Technology is developing but applications and more accurately consumers' needs are not developing the same way in Greece.

Hence, there are other variables that determine the users' attitudes and behaviors [22]. These variables should be the aim of next studies.

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